Space Weather Forecast

Issued on Sunday, 09 January 2022 at 01:02 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor Geomagnetic Storm likely early on Day 1 (Sunday 9th January). Increasing slight chance of Moderate-class flares (R1-R2 radio blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Very Low over the past 24 hours. There are currently four sunspot regions on the visible disc, with the two notable and largest sunspots in the southern hemisphere. There are also two unnumbered sunspots on the Earth facing disc, one in the northern hemisphere, near the meridian and a larger sunspot beginning to rotate around onto the southeast limb. In addition to these regions, the eastern solar horizon is bright in extreme UV flux in both hemispheres, likely indicating some returning sunspots regions in the coming days.
No Earth-directed Coronal Mass Ejections (CMEs) have been observed in currently available imagery.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of a slow regime, before the onset of a CIR (Co-rotating Interacting Region - a piling up of particles immediately ahead of 'coronal holes'), with this preceding the entry into a fast wind from a coronal hole. Solar winds were steady at around 300km/s throughout, before rising to become slightly elevated with the onset of the high speed stream from a coronal hole, at around 470km/s by the end of the period.
The net result of the above solar wind measures was initially Quiet geomagnetic activity, increasing to Active (Kp4) in the 18-21UTC and a G1/Minor Geomagnetic Storm occurring in the 21-00UTC interval.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to remain low, with further common-class flares possible. In addition, there is an increasing daily slight chance of moderate-class X-ray flares, as numerous large returning sunspot regions are expected to rotate onto the Earth-facing side during the current UTC weekend.

Solar Wind / Geomagnetic Activity: There are currently no Earth-directed CMEs in the forecast, and just one non-recurrent coronal hole, CH43. Geomagnetic activity is expected to be Active (kp4) at first, with a G1/Minor Storm likely early on day 1 (Sunday 9th January), and is currently expected to return back to Quiet to Unsettled conditions again from day 2 (Monday 10th January).

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although there is a slightly increasing risk with time with the usual 13 degree a day westward progression if the current front-sided sunspots.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	50	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	1	1	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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